

## PATENT ABSTRACTS OF JAPAN

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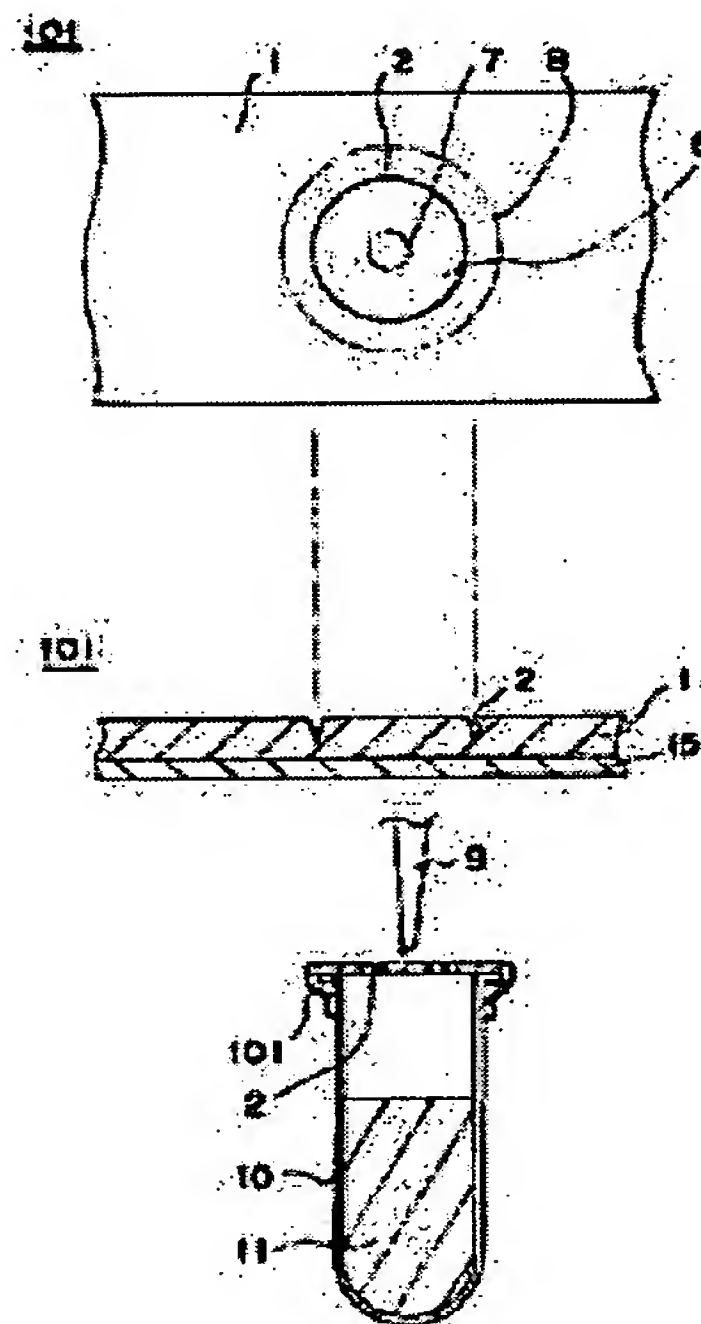
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## (54) CAP FOR SEALING OPENING

## (57)Abstract:

PURPOSE: To improve correspondence with an automatic sampling device, by making a half-cut having such strength that it becomes broken by a force which is weaker than that required for a chip to pierce through a resin film.

CONSTITUTION: A cap 101 comprises a single-layer resin film 1 and an adhesive layer 15 is bonded to its sealing side, and a circular half-cut 2, in an encircling form, is made in the surface of the resin film 1, opposite the sealing side. The half-cut 2 has such strength that it becomes broken by a force which is weaker than that required for a chip 9 to pierce through the resin film 1 when the chip 9 is made to stick up in a half-cut area 6, thus a chip insertion opening is made. When the front end of the chip 9 starts to push the cap 101, the cap 101 slightly stretches by the force of the chip 9. Before the force becomes strong enough for the chip 9 to pierce through the cap 101, the half-cut 2 starts to break. Consequently, the chip insertion opening which spreads two-dimensionally is made.



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CLAIMS

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[Claim(s)]

[Claim 1](1) it is a lid for opening closure which consists of resin films — (2) — to said resin film. Nonlinear-like half cutting which has circumference form or the starting point, and a terminal point is contained, (3) A field surrounded by virtual straight line which connects a field surrounded by line of half cutting of said circumference form, or a line, said starting point and said terminal point of half cutting of the shape of nonlinear [ said ], having a size which does not overflow a field surrounded by inner circumference of an opening which should be closed — (4) — said half cutting, When a chip is thrust into a position of either of the fields surrounded by virtual straight line which connects a field surrounded by line of half cutting of said circumference form, or a line, said starting point and said terminal point of half cutting of the shape of nonlinear [ said ], A lid for opening closure having the intensity fractured with power smaller than power required in order that a chip may pierce said resin film and may penetrate.

[Claim 2]A field surrounded by virtual straight line which connects a field surrounded by line of half cutting of said circumference form, or a line, said starting point and said terminal point of half cutting of the shape of nonlinear [ said ], The lid for opening closure according to claim 1 having the size from which it has same form and a size of said opening as a cross section of a chip in height in the state where advanced from an opening which should be closed and the deepest ingress position was arrived at or, which this cross section does not overflow.

[Claim 3]The lid for opening closure according to claim 1, wherein said resin film is a synthetic resin film which carries out the sealing surface side inside and curls.

[Claim 4]Said resin film is a monolayer or a complex film which consists of a hard plastic film or has a hard plastic film layer, A hard plastic film which constitutes monolayer concerned or a complex film, The lid for opening closure according to claim 1, wherein load required to crush this even to 10-mm width when a specimen with a width of 25 mm which consists of the hard plastic film concerned is bent to looped shape 20 mm in diameter is not less than 50 mg.

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[Translation done.]

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention relates to the lid for opening closure with easy insertion and sampling of a chip when isolating a sample preparatively in more detail about the lid which closes the opening of a cylinder-like-object-with-base-like container like a blood part filling pipe, for example so that preparative isolation of a sample like the blood for analysis which is contents is possible.

[0002]

[Description of the Prior Art]The blood test is conducted widely in a hospital, an examination center, etc. This is because it is because the state of human bodies, such as the amounts of leucocytes including a blood group, a cholesterol amount, and the blood sugar level, can be grasped and people's health condition can be judged from this value by a blood test. It can also be known whether it is infected by the disease germ which causes the illness of hepatitis, an acquired immunodeficiency syndrome, etc., or a virus by the blood test.

[0003]When inspecting such blood, it is common that an inspection different, respectively is conducted about the blood which made the blood which collected blood correspond to an inspection item, divided into the specified quantity [ every ] part filling pipe, and was divided into each distributive-pouring pipe.

[0004]The distributive-pouring pipe used by such inspection is formed with glass or a plastic. What was especially formed with the plastic these days is used abundantly, and there are various kinds of sizes including a test tube Mr. container about 10 mm in diameter and about 80 mm in depth and a thing of form in this distributive-pouring pipe.

[0005]Generally, the blood which collected blood from the patient is divided into the above distributive-pouring pipes. Subsequently, the opening of the distributive-pouring pipe with which blood was divided is covered with the lid made of resin of the size in which insertion to the opening of the distributive-pouring pipe fabricated by methods, such as injection moulding, is possible, The lid was removed after the transfer to the inspection section office, the sample sample splitter implement of the shape of a hollow needle called a chip to the blood in a distributive-pouring pipe was inserted, the blood of the initial complement was sucked up, and the inspection is presented. Many analysis apparatus to which such an inspection process performs automatically the sucking process of the blood by a chip or below these days although human being may perform a complete process cycle are also used.

[0006]By the way, this invention person as what is before replaced with the lid of the type used inserting in, The hollow style was pierced and the lid for opening closure of the film state which laminates an easy peel nature heat seal layer on one side of the resin films (for example, uniaxial-stretching PP film etc.) which can be penetrated is proposed (Tokuganhei7-5421). The lid for opening closure of this film state differs from the lid used inserting in, It is inexpensive, even if contents do not leak, but a sample can be taken out by piercing a chip even if it does not remove a lid, a lid can be removed easily, and the sample whole quantity can also be taken out and it throws away, since it does not separate even if a container falls.

[0007]However, in order to be easier to use the lid of the above-mentioned film state, a chip should thrust and resistance should be made still smaller. In order to improve the correspondence nature to automatic sampling equipment especially, there is the necessity of a chip thrusting and improving a sex. Namely, when it thrusts into the above-mentioned lid, it ranks second and it stabs with a chip to the back of a container with automatic sampling equipment, Since the lid added to a chip may thrust, the sensor of this equipment may detect resistance, it may take for the chip not advancing into a predetermined opening and a machine may stop, trouble may be caused to a smooth sampling.

[0008]Since the drawing resistance of a lid is added to a chip when drawing out the chip thrust into the lid of the above-mentioned film state, there is also a problem that the lid which is closing the opening, and the closed container for sample extraction will be lifted, with a chip. Therefore, a chip thrusts and the one where not only resistance but drawing resistance is possible smaller is desirable.

[0009]

[Problem to be solved by the invention]It is a lid of the film state which this invention is made in view of this actual condition, and is used for the containers for sample extraction including a blood part filling pipe, It thrusts, and resistance tends to use it at the time of resistance (it resists at the time of insertion), and drawing out, being small, and the correspondence nature to automatic sampling equipment is also aimed at providing the high lid for opening closure.

[0010]

[Means for solving problem]to achieve the above objects -- it is a lid for opening closure which consists the lid for opening closure of (1) resin film in this invention -- (2) -- to said resin film. The nonlinear-like half cutting which has circumference form or the starting point, and a terminal point is contained, (3) The field surrounded by the virtual straight line which connects the field surrounded by the line of the half cutting of said circumference form, or the line, said starting point and said terminal point of half cutting of the shape of nonlinear [ said ], having a size which does not overflow the field surrounded by the inner circumference of the opening which should be closed -- (4) -- said half cutting, When a chip is thrust into the position of either of the fields surrounded by the virtual straight line which connects the field surrounded by the line of the half cutting of said circumference form, or the line, said starting point and said terminal point of half cutting of the shape of nonlinear [ said ], It constituted so that it might have the intensity fractured with power smaller than power required in order that a chip may pierce said resin film and may penetrate.

[0011]The field surrounded by the virtual straight line which connects suitably the field surrounded by the line of the half cutting of said circumference form, or the line, said starting point and said terminal point of half cutting of the shape of nonlinear [ said ], It constituted as it had the size from which it has the same form and size of said opening as a cross section of a chip in height in the state where advanced from the opening which should be closed and the deepest ingress position was arrived at or which this cross section does not overflow.

[0012]As another suitable limitation, said resin film constituted so that it might be a synthetic resin film which carries out the sealing surface side inside and curls. It is the monolayer or complex film which consists of a plastic film with said hard resin film as another suitable limitation, or has a hard plastic film layer, When a specimen with a width of 25 mm which consists of the hard plastic film concerned was bent to looped shape 20 mm in diameter, the hard plastic film which constitutes the monolayer concerned or complex film was constituted so that load required to crush this even to 10-mm width might be set to not less than 50 mg.

[0013]

[Function]Since the half cutting of the shape of nonlinear (for example, a circular curve, a polygonal line, etc.) which the lid for opening closure of this invention consists of a film made of a synthetic resin, and has circumference form (for example, circular, a triangle, etc.) or the starting point, and a terminal point is contained, A chip loading slot with two-dimensional breadth can be formed by making this half cutting fracture.

[0014]The field (the following "half cutting part" is called.) surrounded by the virtual straight line which connects the field surrounded by the line of the half cutting of said circumference form, or



the line, said starting point and said terminal point of half cutting of the shape of nonlinear [ said ], Since it has a size which does not overflow the field surrounded by the inner circumference of the container opening which should be closed, it can close in the state where face closing the opening of a container by the lid of this invention, and the above-mentioned half cutting is located on a container opening, and an inner circumference of the opening portion is not overflowed.

[0015]The half cutting provided in the lid of this invention has the intensity fractured with power smaller than power required in order that a chip may pierce the resin film which is a main part of a lid and may penetrate, when a chip is thrust into one position of the half cutting circles.

[0016]Therefore, a container opening is closed in the state where the half cutting part of this lid is exactly located on a container opening, and an inner circumference of the opening portion is not overflowed using the lid of this invention, Subsequently, since a big chip loading slot with two-dimensional breadth is formed before a chip pierces a lid and penetrates when a chip is thrust into one position of the half cutting circles at the tip of a chip, resistance is small at the time of insertion of a chip.

[0017]In this invention, it is considered as the size which makes said half cutting part suitably the same form and size as the cross section in the height of the container opening of the chip in the state where the deepest ingress position of the container which should be closed was arrived at, or this cross section does not overflow.

[0018]When a half cutting part large enough [ such ] is taken, When a chip is thrust into the lid of this invention, with the chip of tapering off which is advancing in a container, half cutting is the same as the cross section in the height of the container opening of a chip, or since it is torn by the size beyond it, resistance becomes increasingly small at the time of the insertion added to a chip from a lid.

[0019]When a half cutting part large enough [ such ] is taken, and drawing out a chip out of a container, the resistance (it resists at the time of drawing out) added to a chip from a lid also becomes very small. That is, since the fracture of half cutting advances with penetration of a chip as mentioned above and a chip loading slot expands and goes when said large enough field is taken, the power of a lid of pushing on a transverse direction the chip which it tries to draw out is only weak power usually applied from the mobile high piece of a fracture. Temporarily, even if the ingress position of a chip is a position which shifted from the center of the opening and met the line of half cutting, the strong power in which a half cutting cutting plane pushes the side of a chip is only applied from one way. Therefore, resistance does not become large at the time of drawing out, so that a lid and a container are lifted.

[0020]When the resin film which carries out the sealing surface side inside and curls is used in this invention as a resin film which is a main part of a lid, Since the mobile piece of a fracture to which the fracture end of half cutting bends backward in the direction which does not oppose the approach direction of a chip, and moreover becomes large with penetration of a chip curls in the direction which does not oppose the approach direction of a chip, the power of a lid of pushing the chip which advanced on a transverse direction becomes still smaller.

[0021]Therefore, when such a resin film is used, it can resist small further at the time of resistance and drawing out at the time of insertion of a chip. When the monolayer or complex film which has a hard plastic film which has the strength of the elasticity beyond the above fixed test values is used in this invention as a resin film which is a main part of a lid, Since a lid cannot be easily extended when a chip is thrust into the lid which closed the opening, it concentrates on the portion of half cutting, without the thrust of a chip being absorbed by the lid. Therefore, the fracture nature of half cutting can improve and it can resist small at the time of insertion of a chip.

[0022]

[Working example]Hereafter, although this invention is explained in more detail in accordance with an embodiment, the contents of each Drawings are first explained before that.

[0023]Drawing 1 (a) is a top view showing an example (101) of the lid of this invention, and drawing 1 (b) is a cross-sectional view of the same lid. This lid 101 consists of the resin film 1 of a monolayer, and the adhesives layer 15 is laminated at that sealing surface side.

The sealing surface is put into the circular half cutting 2 which is circumference form on the surface of an opposite hand.

The field 6 surrounded by the line of the circular half cutting 2, i.e., a half cutting part, has a size which does not overflow the inner circumference of the container opening which was shown with the imaginary line 8, and which should be closed.

And it has a size which the cross section in the height of the container opening of the chip in the state where the deepest ingress position in the container shown with the imaginary line 7 was arrived at does not overflow.

And the half cutting 2 has the intensity fractured with power smaller than power required in order that a chip may pierce the resin film 1 and may penetrate, when a chip is thrust into the position of either of the half cutting parts 6.

A chip loading slot can be formed.

[0024]Drawing 2 is a perspective view showing the state where the opening of the container was closed by the lid 101 of drawing 1. In closing a container opening using the lid of this invention, it closes an opening in the state where the half cutting part 6 of a lid is exactly located on a container opening in this way, and an inner circumference of the opening portion is not overflowed.

[0025]Drawing 3 (a) – (d) is an explanatory view showing signs that the lid 101 of drawing 1 fractures. In drawing 3 (a), the chip 9 descends on the container opening closed by the lid 101 of this invention, the tip of the chip 9 reaches the arbitrary positions of half cutting circles in drawing 3 (b), and it is begun to push the lid 101. At this time, a lid is extended a little with the power of a chip. Next, in drawing 3 (c), the power in which a chip pushes a lid becomes strong gradually as descent of the chip 9 progresses, but before the power becomes strong so that a chip pierces a lid and can penetrate, half cutting begins to fracture. And a chip loading slot with two-dimensional breadth is formed.

[0026]In drawing 3 (d), the chip 9 advances to the back in a container, and a tip's point reaches in a sample and sucks up the sample 11. The half cutting part 6 of the lid 101 is shown by the A–A section, and has a size which the cross section shown with the imaginary line 7 does not overflow in drawing 1 (a) on the cross section in the height of the container opening of the chip in the state where the deepest ingress position in a container was arrived at, i.e., drawing 3, (d). For this reason, when the tapering chip advances, a chip loading slot can extend gradually, and in connection with it, the half cutting 2 is the same as the cross section in the height of the container opening of a chip, or is gradually beaten by the size beyond it. Therefore, a chip loading slot is expanded by penetration of a chip. The power of a lid of pushing the chip 9 on a transverse direction when drawing out the chip which reached the deepest part in a container is only weak power usually applied from the mobile high piece 14 of a fracture.

[0027]Drawing 4 (a) is a top view showing other examples (102) of the lid of this invention, and drawing 4 (b) is a cross-sectional view of the same lid. This lid 102 consists of the resin film 1 of multilayer structure, and the resin layer of heat-sealing nature is laminated by that sealing surface side surface.

The adhesives layer is not laminated.

The half cutting 2 is U shape belonging to the nonlinear-like linearity which has the starting point and a terminal point.

It is put in in the sealing surface side surface of the lid.

The field 6 surrounded by the virtual straight line 5 which connects between the line of the half cutting 2 of U shape and the starting point 3–terminal point 4, i.e., a half cutting part, has a size which does not overflow the inner circumference of the container opening which was shown with the imaginary line 8, and which should be closed.

And it has a size which the cross section in the height of the container opening of the chip in the state where the deepest ingress position in the container shown with the imaginary line 7 was arrived at does not overflow.

And the half cutting 2 has the intensity fractured with power smaller than power required in order that a chip may pierce the resin film 1 and may penetrate, when a chip is thrust into the

position of either of the half cutting parts 6.  
A chip loading slot can be formed.

[0028]Drawing 5 is an explanatory view showing other examples (103) of a lid of this invention. Since a resin film which carries out the sealing surface side inside and curls is used for this lid 103 as a resin film which is a main part of a lid, The fracture end 12 of half cutting bends backward in the direction which does not oppose an approach direction of the chip 9, and, on the other hand, the mobile piece 14 of a fracture which becomes large with penetration of a chip curls in the direction which does not oppose an approach direction of the chip 9. Therefore, power of a lid of pushing a chip which advanced on a transverse direction becomes still smaller, and resistance becomes still smaller by extension at the time of resistance and drawing out at the time of insertion of a chip.

[0029]Drawing 6 (a) – (c) is an explanatory view showing other examples (104) of a lid of this invention. A complex film which laminates a layer of a hard monolayer plastic film or a hard plastic is used for this lid 104 as a resin film which is a main part of a lid. In drawing 6 (a), the chip 9 descends on a container opening closed by the lid 104, a tip of the chip 9 reaches arbitrary positions of half cutting circles in drawing 6 (b), and it is begun to push the lid 104. Since the lid 104 has a layer of a hard plastic at this time, even if pushed on a tip's point, it is hardly inelastic. And in drawing 6 (c), power in which a chip pushes a lid becomes strong gradually as descent of the chip 9 progresses, but it concentrates on a portion of half cutting, without being absorbed by almost inelastic lid, and, as a result, half cutting fractures the power still more easily.

[0030]Along with each figure mentioned above, this invention is explained in detail below. A lid of this invention consisted of resin films, and half cutting of the shape of nonlinear [ which can form a chip loading slot which has two-dimensional breadth in this resin film ] is contained, A half cutting part has a size which does not overflow inner circumference of a container opening, and said half cutting has the intensity fractured with power smaller than power required in order that a chip may pierce this film and may penetrate, when a chip is thrust into this film.

[0031]The resin film 1 which is a main part of a lid may be a monolayer film like the lid 101 shown in drawing 1, and may be a complex film like the lid 102 shown in drawing 4. Although thickness in particular of a resin film is not limited, it is usually about 10–150 micrometers. Material in particular of a resin film is not limited, but For example, polyethylene terephthalate (PET), Polyester system resin, such as polyethylenenaphthalate (PEN) and polybutylene terephthalate (PBT), High density polyethylene (HDPE), medium density polyethylene (MDPE), Low density polyethylene (LDPE), straight-chain-shape low density polyethylene (LLDPE), Olefin system resin, such as polypropylene (PP) and a cyclic olefin copolymer (COC), other polystyrene (PS), polycarbonate (PC), nylon (Ny), poly phenylene sulfone (PPS), polyvinyl chloride (PVC), etc. can be illustrated.

[0032]It is preferred to use the resin film which carries out the sealing surface side inside and curls like the lid 103 shown in drawing 5 as a resin film. The method of laminating two kinds of synthetic resins in which heat shrinkage rates differ as a method of creating the film of such curl nature, the method of laminating the resin film of two sheets, where a tension strong against one film is applied, etc. can be illustrated. For example, if polyester and polyolefine are extruded and it laminates by the coat method or the co-extrusion coat method, the film which carries out the polyolefin layer side inside and on which the polyolefine usually curls rather than polyester since the heat shrinkage rate is large will be made. If dry laminate of a stretched polypropylene film (OPP) and the non-stretched polypropylene film (CPP) is carried out to it, applying a tension to CPP strongly, the film which carries out the CPP layer side inside and curls will be made.

[0033]It is also preferred to use the complex film which laminates the monolayer film or the hard plastic layer which consists of a hard plastic film like the lid 104 shown in drawing 6 as a resin film. When using the latter complex film, the fracture nature of half cutting can be raised more by putting the half cutting which penetrates the layer of a hard plastic into a complex film.

[0034]Here, a hard plastic film or a hard plastic layer means what shows the strength of the elasticity (rigidity) beyond constant value by the loop stiffness test described below. Namely, in



the loop stiffness test said to this invention, Drawing 8 (a) As shown in – (d), the 25 mm wide ( $l_1$ ) specimen film 50 is pinched by the two clamps 51 and 51 which separated a 62.8-mm interval ( $l_2$ ), both clamps are made to approach, between is closed, and a loop 20 mm in diameter ( $l_3$ ) is formed with a specimen. And when you push this loop by the indenter 52 vertically from the peak and it is shrunken even by 10 mm ( $l_4$ ) in width, let the load concerning the indenter 52 be a loop stiffness test test value. As for the hard plastic film or the hard plastic layer of this invention, it is preferred that this test value is not less than 50 mg. As equipment for doing this examination, Oriental Energy Machine factory loop stiffness circuit tester can be illustrated, for example.

[0035]As the above hard plastic films or a formation material of a hard plastic layer, For example, polyethylene terephthalate (PET), polyethylenenaphthalate (PEN), Polybutylene terephthalate (PBT), a cyclic olefin copolymer (COC), polystyrene (PS), polycarbonate (PC), poly phenylene sulfone (PPS), polyvinyl chloride (PVC), etc. can be illustrated.

[0036]Like the lid 101 shown in drawing 1, with a sealing surface, the half cutting 2 may put in on the surface of an opposite hand, and may be put into a sealing surface like the lid 102 shown in drawing 4. When a resin film is a complex film, it may put into an intermediate layer.

[0037]As long as the chip loading slot in which the form of the half cutting 2 has two-dimensional breadth by the fracture of half cutting is formed, there may not be any restriction in particular, and it may be circumference form like drawing 1, and may be the nonlinear-like linearity which has the starting point and the terminal point like drawing 4. The circumference form as used in this invention means the two-dimensional form drawn when one line without branching goes around. As such circumference form, a quadrangle, a triangle, a star shape besides [ which was shown, for example in drawing 1 (a) ] being circular, etc. can be illustrated. On the other hand, as nonlinear-like linearity which has the starting point and a terminal point, a circular curve, a polygonal line, etc. besides U shape shown, for example in drawing 4 (a) can be illustrated. However, as for half cutting, since the ingress position of the chip to a container opening has dispersion and a tip's point is not always thrust into the center of the half cutting part 6, and since it is more desirable to form a chip loading slot as greatly as possible, it is preferred to suppose that it is circular.

[0038]A field surrounded by line of the half cutting 2 as it was shown in drawing 1 (a), when half cutting was circumference form in the half cutting part 6 in this invention is meant, In the case of linearity of the shape of nonlinear [ in which half cutting has the starting point and a terminal point ], a field surrounded by the virtual straight line 5 which connects between a line of the half cutting 2 and the starting point 3-terminal point 4 as shown in drawing 4 (a) is meant. This half cutting part 6 needs to be a size which does not overflow inner circumference of a container opening which was shown with the imaginary line 8, and which should be closed. Since the half cutting circumference of a lid pastes up with a container wall side in being so large that the half cutting part 6 overflows inner circumference of a container opening, half cutting stops fracturing.

[0039]As for the half cutting part 6, it is preferred to have the size from which it has same form and a size of said opening as a cross section of a chip in height in the state where advanced from a container opening and the deepest ingress position was arrived at or which this cross section does not overflow. A cross section of said chip is a cross section of a position shown with an A-A cutting plane line in drawing 3 (d), and drawing 1 (a) and drawing 4 (a) are shown by the imaginary line 7. By enlarging the half cutting part 6 enough [ such ], it can resist smaller at the time of resistance and drawing out at the time of insertion of a chip.

[0040]The half cutting 2 needs to fracture with power smaller than power required in order that a chip may pierce the resin film 1 which is a main part of a lid and may penetrate, when a chip is thrust into the position of either of the half cutting parts 6. The film thickness of the portion by which half cutting was carried out is a major factor which adjusts breaking strength. Although it should be set up this thickness taking into consideration the power etc. which are applied to a lid from the chip which is going to advance into the construction material of a resin film, or a container, it is usually preferably set as the range of 3–30 micrometers 1–35 micrometers. There is a possibility that this thickness may produce a pinhole in less than 1 micrometer, and when 35



micrometers was exceeded and it thrusts on the other hand, a chip may bend.

[0041]As a method of putting the half cutting 2 into the resin film 1, the method of putting in with a metal blade etc. and the method of carrying out heating evaporation and putting in a specific synthetic resin layer by laser etc., can be illustrated, for example. In consisting of a case where a resin film is comparatively thick, or a single material, the former is suitable, and the latter is suitable in coming to laminate several synthetic resin layers from which a resin film is thin and laser absorption wavelength differs mutually. In the case of the latter, it must irradiate with the laser which has the wavelength which can absorb a resin layer to put half cutting into. For example, to polyethylene terephthalate (PET), a polyvinylidene chloride (PVDC), nylon (Ny), etc., 10.6 micrometers ( $943\text{ cm}^{-1}$ ) are suitable, and  $\text{CO}_2$  laser is common as what emits this wavelength.

[0042]Although the method of pasting up as a method of fixing to the opening which should close the lid of this invention by the method and binder which are physically fixed with adhesive tape etc., for example, heat-sealing material, etc., etc. can be illustrated, productivity and the viewpoint of cost to the latter is preferred. Therefore, in the sealing surface of the lid of this invention, as shown in drawing 1 (b), the adhesives layer 15 may be laminated if needed. Instead of laminating the adhesives layer 15, as shown in drawing 4 (b), the complex film which has a synthetic resin layer of heat-sealing nature may be used for a sealing surface side surface as the resin film 1. It is preferred to adopt what has easy peel nature as an adhesives layer or a synthetic resin layer of heat-sealing nature. When these layers have easy peel nature, it becomes easy to remove a cover material from a container opening and to sample contents by a help.

[0043]As a binder, although based also on construction material of a resin film or a container which should be closed, For example, a chloroprene system, a polyisobutylene system, a polyisoprene system, a polyacrylic ester system, a polyvinyl ether system, a butadiene series, a styrene-butadiene-rubber system, an isobutylene-isoprene-rubber system, crude rubber, reclaimed rubber, etc. can be used.

[0044]As a heat-sealing agent which has easy peel nature, although based also on construction material of a resin film or a container which should be closed, for example, a vinyl acetate system, chloride and a vinyl acetate system, a VCM/PVC system, and acrylic (PMA.) Polyester systems, such as MMA, EMA, and EAA, an EVA system, a PVA system, a polyolefin system, denaturation polyolefin systems (maleic acid modified polyethylene, chlorinated polypropylene, etc.), a urethane system, and a urethane denaturation polyester system -- a urethane denaturation polyester system, a polyether system, a denaturation ether type polyester system, etc. can be used in part.

[0045]And an above-mentioned binder and a heat-sealing agent can be used with a form of various forms, for example, a drainage system, a solvent system, a hot melt type, an emulsion type, etc. An easy peel nature heat-sealing agent usually adjusts a presentation etc. so that bond strength of softening temperature may be 50 to 300 gf/15 mm above 80 \*\*. In order to adjust heat-sealing nature, tackifiers, such as petroleum resin, can also be blended.

[0046]The easy peel nature heat-sealing agent used makes the raw material which usually constitutes the resin film in which it is applied and this raw material, and the raw material to paste up correspond, and is selected. Therefore, when the container is formed with plastics and glass, such as polypropylene (PP) and polyethylene (PE), what can paste up these raw materials and lids is chosen. For example, alpha like polyethylene or polypropylene as a resin film used as a base material -- when an olefin (\*\*) polymer is used, As this easy peel nature heat-sealing agent, It is preferred to use olefin system easy peel nature heat-sealing agents, such as MC-3800 (made by Mitsubishi Petrochemical Co., Ltd.) and AD-345 (Oriental Morton, Inc.), When the resin which has a polar group like polyethylene terephthalate is used as a base material, it is preferred to use a polyester system easy peel nature heat-sealing agent like PES-330SK (Toagosei Chemical industry), for example.

[0047]the coverage of an easy peel nature heat seal layer -- usually --  $1\text{--}15\text{g/m}^2$  -- it is within the limits of  $2\text{--}10\text{ g/m}^2$  preferably. This easy peel nature heat seal layer can form the above

easy peel nature heat-sealing agents by applying to the sealing surface side of a resin film, for example with publicly known coating methods, such as a photogravure reverse coating machine and a photogravure coating machine.

[0048]The printing layer which indicates directions for use, notes, etc. may be provided in the lid of this invention. In closing a container opening using the lid of this invention, as shown in drawing 2, it closes an opening in the state where the half cutting part 6 of a lid is exactly located on a container opening, and an inner circumference of the opening portion is not overflowed. A help may perform such closure operation and an automaton may perform. However, as for the lid of this invention, since the correspondence nature to automatic sampling equipment is high, it is preferred to perform a series of operations from closure operation to a sampling in consistency with an automaton.

[0049]The lid of this invention is the real fairness 4, for example. - It can be used as a film for closure used for a test tube opening sealing arrangement which is indicated in the No. 3625 gazette. If it explains along with drawing 7, the lid 105 for opening closure of this invention is usually wound around rolled form with the form of the film. And the film drawer device 29 of the film set-up mechanism 25 is operated first, and the end of the lid 105 of film state is gathered and pulled out from the film supply machine 28. At this time, the container 10 for sample extraction specified as a distributive-pouring pipe has been conveyed in accordance with the carrying path 22 by drawing 7.

It has stopped in the 1st position.

The lid 105 of this invention of said pulled-out film state is horizontally stretched by the opening 10a of this stopped container 10 for sample extraction.

[0050]Next, it presses down and the lid 105 of the film state of this invention is pinched from up-and-down both sides with the board 31 and the backing plate 32. At this time, the lid 105 of the film state of this invention is cut in a transverse direction near the feed hopper of the film supply device 28 by the cutting blade 35 attached to the presser-foot board 31. In this way, the periphery will be held with the film contact mechanism 30 by the cut lid 105 of film state.

[0051]Subsequently, the film contact mechanism 30 descends, where the periphery of the cut lid 105 is held. If the film contact mechanism 30 descends to a predetermined level, the center section of the lid 105 will contact the opening 10a of the container for sample extraction. In this way, after the lid 105 contacts the opening 10a, the lid 105 is released from the presser-foot board 31 and the backing plate 32. The cylindrical body 44 currently interlocked with the cylinder 42 of the film covering mechanism 40 via the piston axis 43 simultaneously with this descends, and it fits into the upper bed part of the container 10 for sample extraction. The periphery of the lid 105 is narrowed down by this cylindrical body 44, and the peripheral face of the container 10 for sample extraction will be met by the lid 105. In the state where it was covered with the film piece which is the lid 105 of this invention about the opening 10a as mentioned above, the container 10 for sample extraction moves forward, and stops a carrying path to the 2nd stop position where it had the film weld mechanism (with no graphic display). A film weld mechanism descends from the upper part of the container 10 for sample extraction which stopped in this 2nd position, and heat crimping of the lid 105 is carried out to the periphery of the opening 10a of the container for sample extraction.

[0052]In this way, it is sent into the analysis apparatus equipped with the chip, a chip is thrust into a lid, a chip is inserted into a container, the sample in a container is extracted and the container for sample extraction by which the lid of this invention was welded on the opening is analyzed.

[0053]Next, the example of an experiment is shown.

A 30-micrometer-thick extension polypropylene (OPP) film is used as example of experiment 1 resin film, With the sealing surface of this film, 15-micrometer-deep half cutting is put in by a round shape 9 mm in diameter with a metal blade 9 mm in diameter on the surface of an opposite hand, Furthermore, the PVA system heat-sealing agent was applied to the sealing surface side of a film by the gravure coating method (coverage  $4\text{g}/\text{m}^2$ ), and the lid of this invention was manufactured.

[0054]Next, the above-mentioned lid was laid in the opening of the part filling pipe made from polypropylene (10 mm in inside diameter, a depth of 80 mm) which put in 1 ml of blood, and it heat sealed for the seal temperature of 140 \*\*, and seal time 1 second on condition of sealing pressure [ of 3kg/cm ] <sup>2</sup>.

[0055]After the seal, although had a distributive-pouring pipe in the hand, it was made to shake for several seconds and was laid down subsequently to the width during 10 seconds, blood did not leak. Half cutting was torn when the chip whose overall diameter in the range which passes a distributive-pouring pipe opening when it advances most deeply into a distributive-pouring pipe the diameter at a tip is 1 mm and is 4 mm was thrust into the half cutting circles of this lid. Also when sampling a chip after sucking up the blood in a distributive-pouring pipe with a chip, the distributive-pouring pipe was not lifted.

[0056]Blood when it is put to sleep the raw material of a resin film, thickness, and horizontally thrusts into the 1st table, and the existence of lifting of a sex and a part filling pipe is collectively shown in it.

In the example 1 of example of experiment 2 experiment, a 30-micrometer-thick extension polyethylene terephthalate (OPET) film is used instead of an OPP film, It examined by operating it similarly and manufacturing the lid of this invention except having applied the polyester system heat-sealing agent instead of the PVA system heat-sealing agent (coverage 5g/m<sup>2</sup>). A result is shown in the 1st table.

[0057]A 100-micrometer-thick high impact type polystyrene (HIPS) sheet is used as example of experiment 3 resin film, With the sealing surface of this film, 90-micrometer-deep half cutting was put in by a round shape 9 mm in diameter with a metal blade 9 mm in diameter on the surface of the opposite hand, the butadiene series binder was further applied to the sealing surface side of a film by the gravure coating method (coverage 8g/m<sup>2</sup>), and the lid of this invention was manufactured. Next, the above-mentioned lid was laid in the opening of the part filling pipe made from polypropylene (10 mm in inside diameter, a depth of 80 mm) which put in 1 ml of blood, and it was stuck by pressure by sealing pressure 5 kg/cm<sup>2</sup>. Then, it examined like the example 1 of an experiment. A result is shown in the 1st table.

[0058]In the example 1 of example of experiment 4 experiment, the coextruded film (COC layer: 100 micrometers, PE layer:10micrometer) of a cyclic polyolefin copolymer (COC) and polyethylene (PE) was used instead of the OPP film, and it was similarly operated except having put half cutting into the COC layer side. A result is shown in the 1st table.

[0059]After applying a polyester system anchor coat agent (AC) to a 12-micrometer-thick extension polyethylene terephthalate (OPET) film at a rate of 1 g/m<sup>2</sup> as example of experiment 5 resin film, The film (OPET layer: 12 micrometers, AC layer:1micrometer, PE layer:13micrometer) which obtained it by extruding and carrying out the coat of the polyethylene (PE) was used. When the doughnut shape was irradiated with the CO<sub>2</sub> laser beam with a wavelength of 10.6

micrometers (943cm<sup>2</sup>), only the OPET layer evaporated on this film and the circular half cutting which is 9 mm in inside diameter, 0.3 mm in width, and a depth of 12 micrometers went into it. After putting in half cutting, it examined by operating it like the example 1 of an experiment, and coating the PE layer side with a heat seal layer. A result is shown in the 1st table.

[0060]After replacing with an extruded film and applying a polyester system anchor coat agent (AC) to a 12-micrometer-thick extension polyethylene terephthalate (OPET) film at a rate of 1 g/m<sup>2</sup> in the example 5 of example of experiment 6 experiment, It examined by operating it similarly and manufacturing the lid of this invention except having used the film (OPET layer: 12 micrometers, AC layer:1micrometer, PP layer:15micrometer) which obtained it by carrying out dry laminate of the 15-micrometer-thick polypropylene (PP) film. A result is shown in the 1st table.

[0061]As example of experiment 7 resin film, to the OPET side side of the OPET/AC/PE extruded film used in the example 5 of an experiment. After applying a polyester system anchor coat agent (AC) at a rate of 1 g/m<sup>2</sup>, The film which obtained it by carrying out dry laminate of



the 100-micrometer-thick high impact type polystyrene (HIPS) sheet (HIPS layer: 100 micrometers) AC layer : to the HIPS layer side surface of this film using 1 micrometer, OPET layer:12micrometer, AC layer:1micrometer, and PE layer:13micrometer. 110-micrometer-deep half cutting was put in by a round shape 9 mm in diameter with a metal blade 9 mm in diameter, the PVA system heat-sealing agent was further applied to the PE layer side by the gravure coating method (coverage  $4\text{g/m}^2$ ), and the lid of this invention was manufactured. This lid was heat sealed to the distributive-pouring pipe opening, and it examined like the example 1 of an experiment after that. A result is shown in the 1st table.

[0062]It examined by operating it like the example 1 of an experiment, and manufacturing a lid except not having put in comparative example 1 half cutting. In the case of this lid, the chip pierced and penetrated, but the distributive-pouring pipe was also lifted together at the time of chip sampling. A result is shown in the 1st table.

[0063]It examined by operating it like the example 3 of an experiment, and manufacturing a lid except not having put in comparative example 2 half cutting. In the case of this lid, when a chip was pierced, a tip's point was not able to bend, and a chip was not able to be pierced. A result is shown in the 1st table.

[0064]It examined by operating it like the example 5 of an experiment, and manufacturing a lid except not having put in comparative example 3 half cutting. In the case of this lid, the chip pierced and penetrated, but the distributive-pouring pipe was also lifted together at the time of chip sampling. A result is shown in the 1st table.

[0065]

[Table 1]

第 1 表

	基材 (外側面⇄内側面)	厚み [ $\mu\text{m}$ ]	横に寝かせた ときの血液の 漏れ	チップの挿入性 又はつきさし ※注 1	チップの抜き取 り時の分注管の 持ち上がり ※注 2
実験例 1	OPP	30	なし	○	○
実験例 2	OPET	30	なし	○	○
実験例 3	HIPS	100	なし	○	○
実験例 4	COC/PE	100/10	なし	○	○
実験例 5	OPET/AC/PE	12/1/13	なし	○	○
実験例 6	OPET/AC/PP	12/1/15	なし	○	○
実験例 7	HIPS/AC/OPET/AC/PE	100/1/12/1/13	なし	○	○
比較例 1	OPP	30	なし	○	×
比較例 2	HIPS	100	なし	×	—
比較例 3	OPET/AC/PE	12/1/13	なし	○	×

The notes 1 — O: — insertion of a chip — or it thrusts and penetration is possible.

x: — insertion of a chip — or it thrusts and penetration is impossible.

[0066]Notes 2 —O: A minute filling pipe is not raised.

x: A minute filling pipe is raised.

[0067]

[Effect of the Invention]If a chip is thrust into the container opening closed by the lid of this invention, half cutting will fracture by power smaller than the power which a chip needs for piercing a lid and penetrating, and a big chip loading slot with two-dimensional breadth will be formed in a lid. Therefore, since a chip can be inserted easily and a sample can be sucked up, without receiving resistance in the container opening in the state where a lid is not removed, at the time of excessive insertion, the time and effort at the time of a sampling can be saved, and sensor misconception of automatic sampling equipment can also be prevented.

[0068]Since resistance is also small at the time of sampling, the lid of this invention can also

prevent lifting of the container at the time of chip sampling, and can secure smooth sampling operation.

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[Translation done.]

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1]Drawing 1 (a) is a top view showing an example of the lid of this invention. Drawing 1 (b) is a cross-sectional view of the same lid.

[Drawing 2]It is a perspective view showing the state where the container opening was closed by the lid of this invention.

[Drawing 3]It is an explanatory view showing signs that half cutting fractures and a chip advances into a container. Drawing 3 (a) shows the state where a chip descends, drawing 3 (b) shows the state where a tip's point begins to push a lid, drawing 3 (c) shows the state where half cutting begins to fracture, and drawing 3 (d) shows the state where the ingress position where a chip is the deepest was arrived at.

[Drawing 4]Drawing 4 (a) is a top view showing other examples of the lid of this invention.

Drawing 4 (b) is a cross-sectional view of the same lid.

[Drawing 5]It is an explanatory view showing other examples of the lid of this invention.

[Drawing 6]It is an explanatory view showing other examples of the lid of this invention. Drawing 6 (a) shows the state where a chip descends, drawing 6 (b) shows the state where a tip's point begins to push a lid, and drawing 6 (c) shows the state where half cutting begins to fracture.

[Drawing 7]It is a figure showing an example of the equipment for closing the opening of the container for sample extraction using the lid of this invention.

[Drawing 8]Drawing 8 (a) - (d) is an explanatory view showing a series of operating procedures of a loop stiffness test.

[Explanations of letters or numerals]

1 -- Resin film

2 -- Half cutting

3 -- Starting point

4 -- Terminal point

5 -- Imaginary line which connects the starting point and a terminal point

6 -- Half cutting part

7 -- Cross section in the opening height of a chip which arrived at the deepest ingress position

8 -- Inner circumference of a container opening

9 -- Chip

10 -- Container for sample extraction

11 -- Sample

12 -- Fracture end

13 -- Torn surface

14 -- Piece of a fracture

15 -- Adhesives layer

22 -- Carrying path

28 -- Film supply device

30 -- Film contact mechanism

31 -- Presser-foot board

32 -- Backing plate



- 35 -- Cutting blade
- 44 -- Cylindrical body
- 50 -- Specimen
- 51 -- Clamp
- 52 -- Indenter
- l1 -- Width of a specimen
- l2 -- Interval during a clamp
- l3 -- Diameter of a loop
- l4 -- Loop width when crushed

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[Translation done.]

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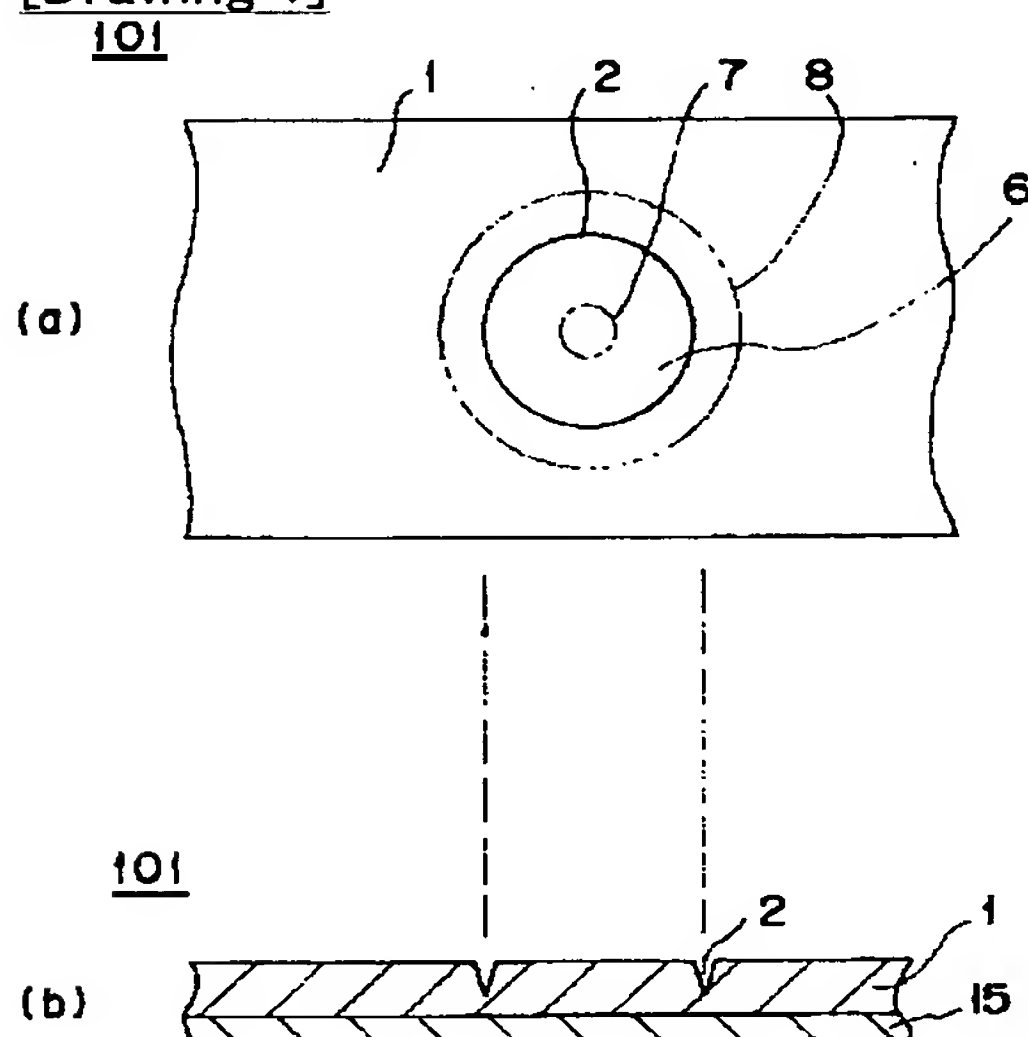
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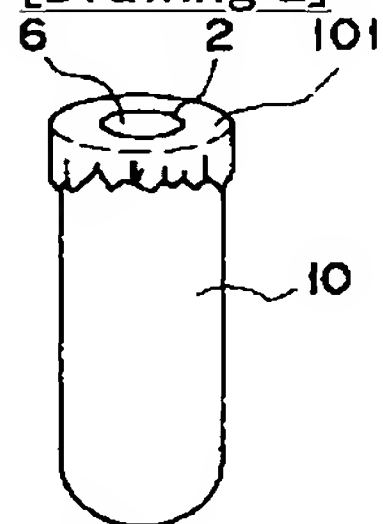
DRAWINGS

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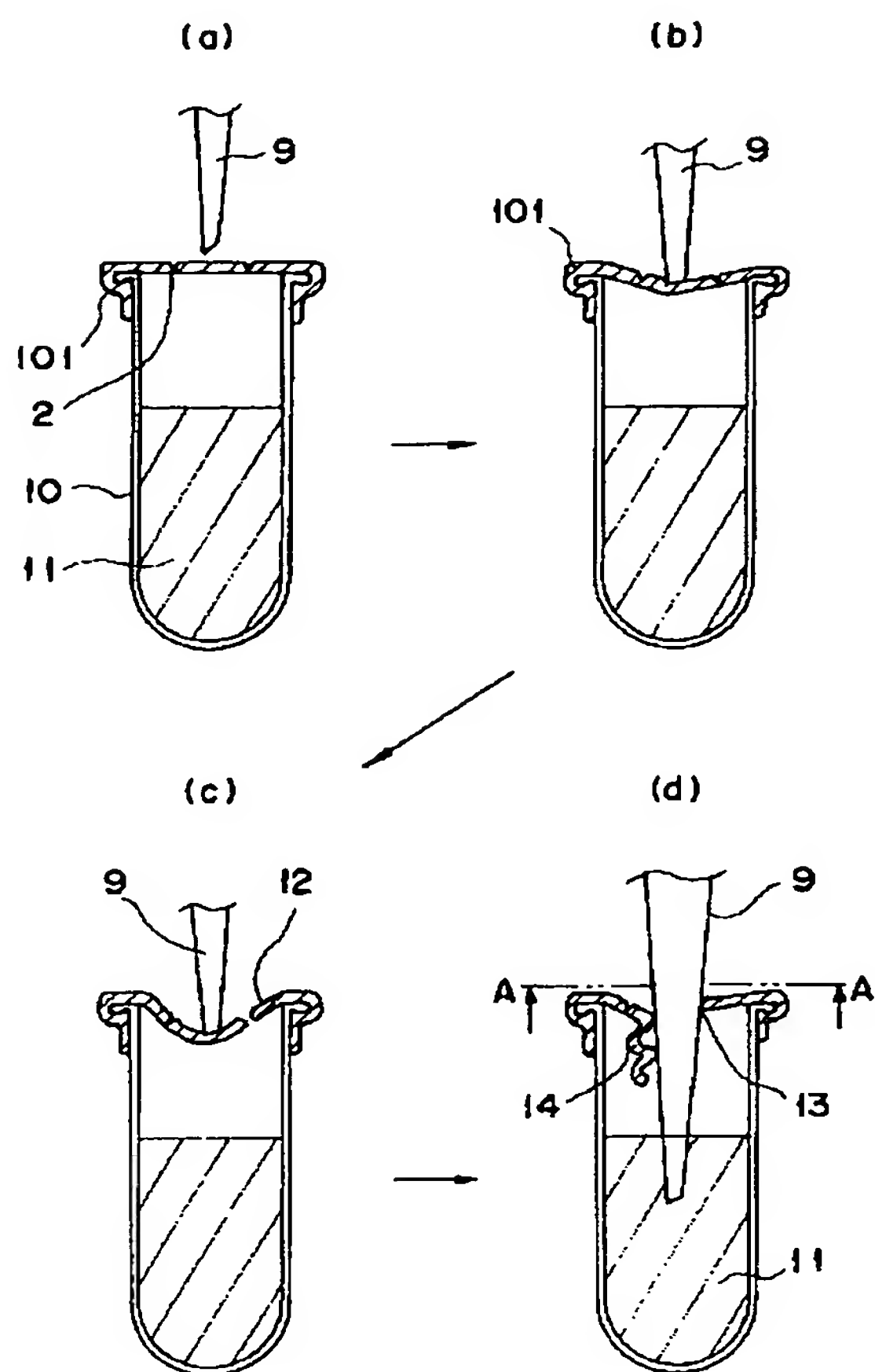
[Drawing 1]



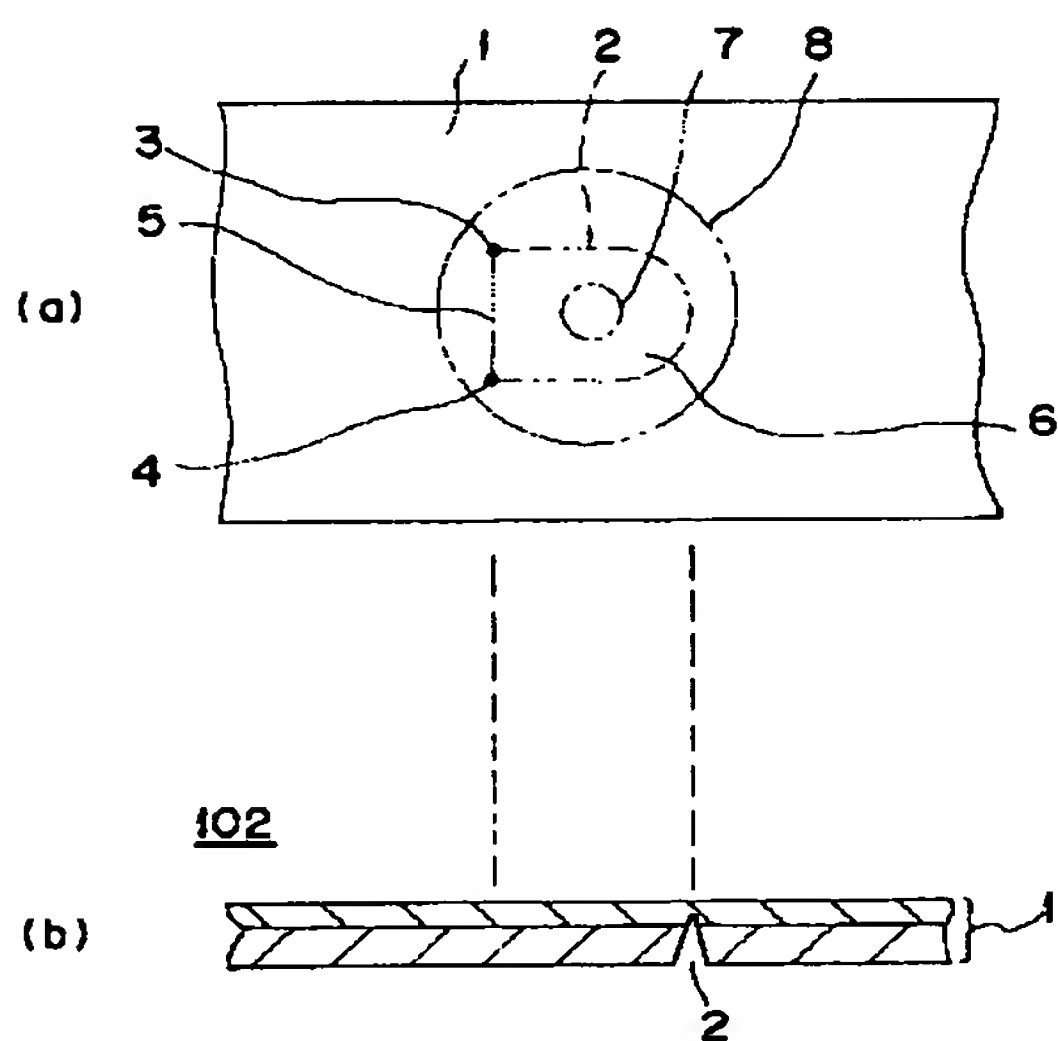
[Drawing 2]



[Drawing 3]

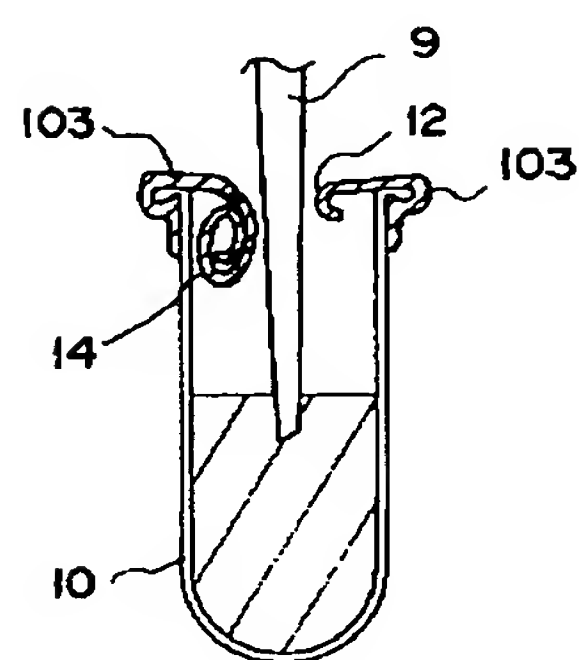


[Drawing 4]  
102

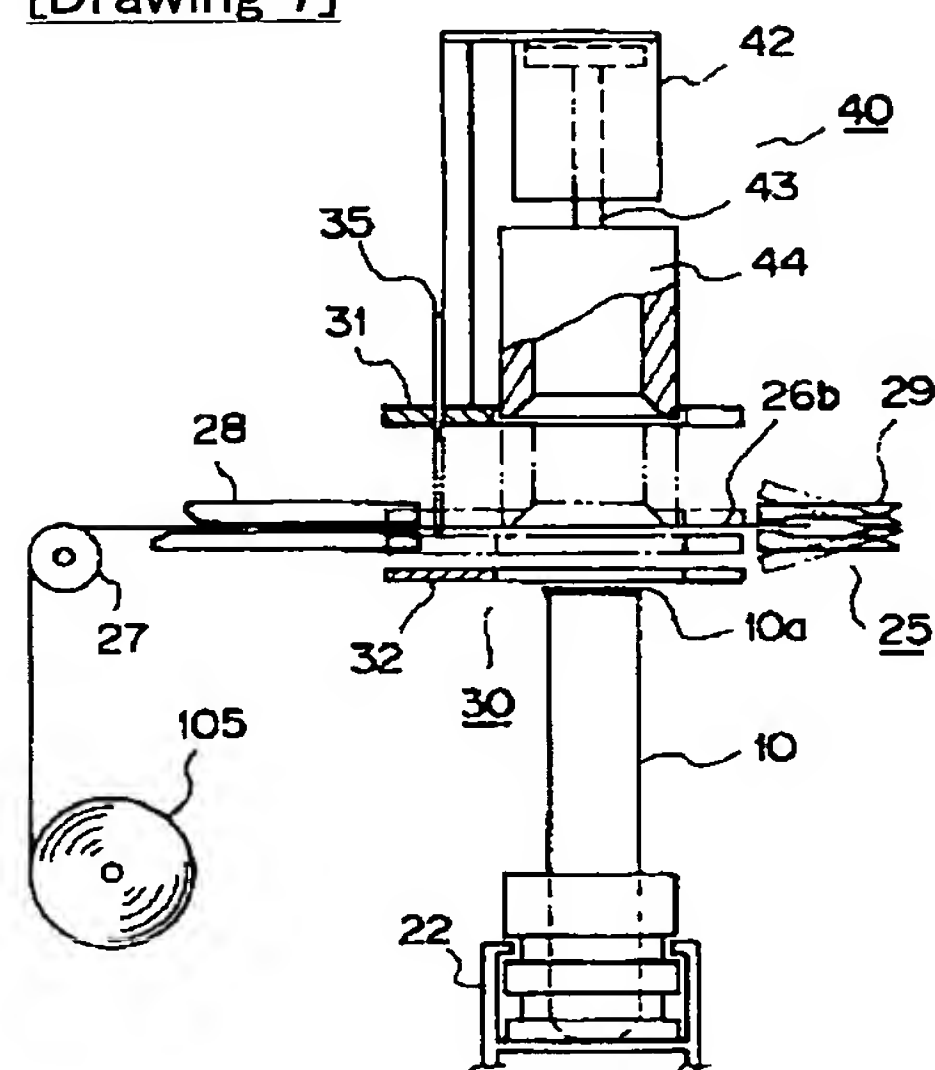


[Drawing 5]

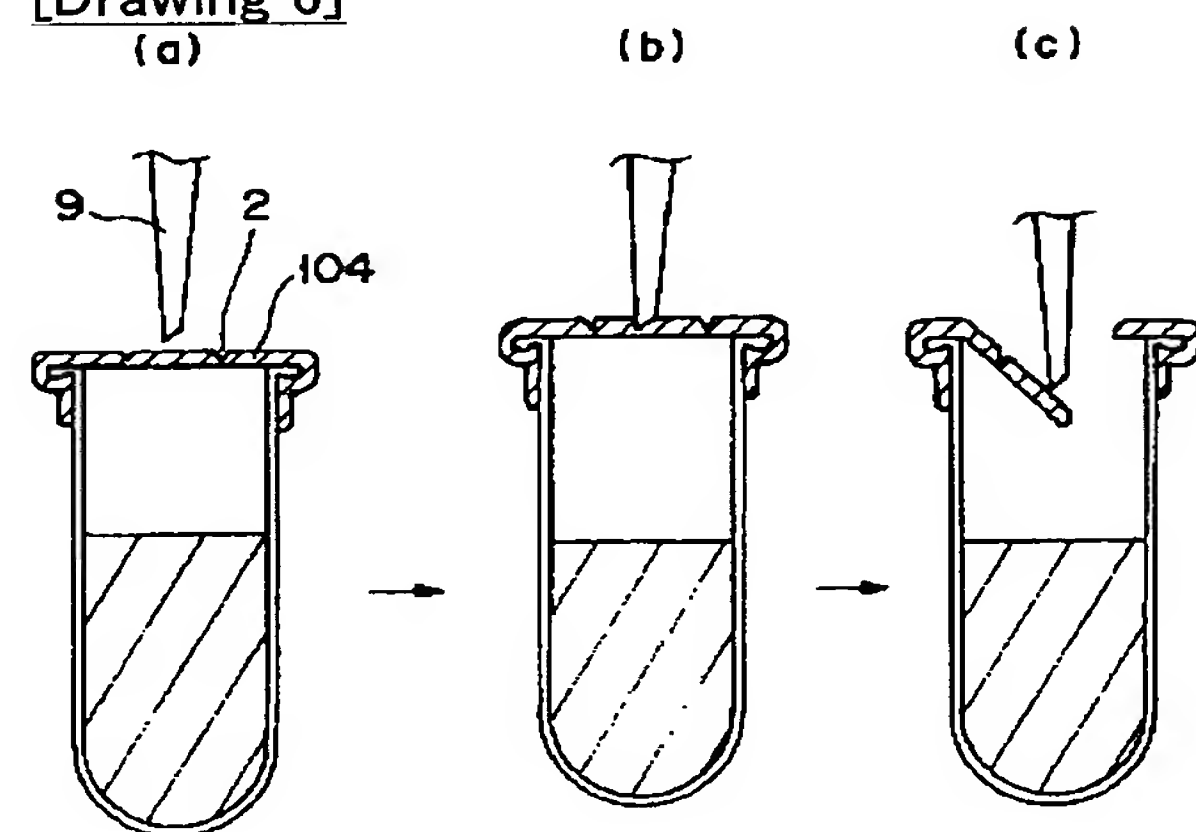




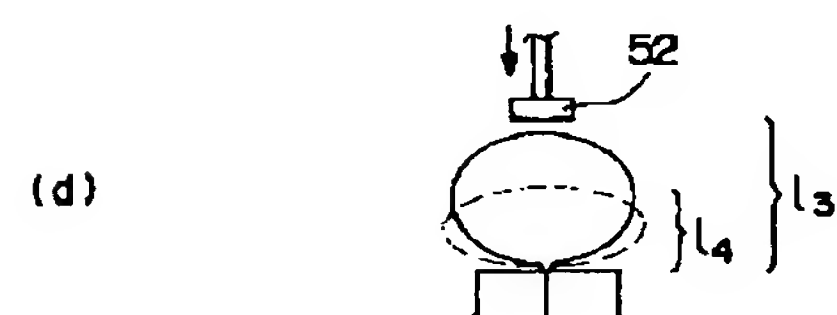
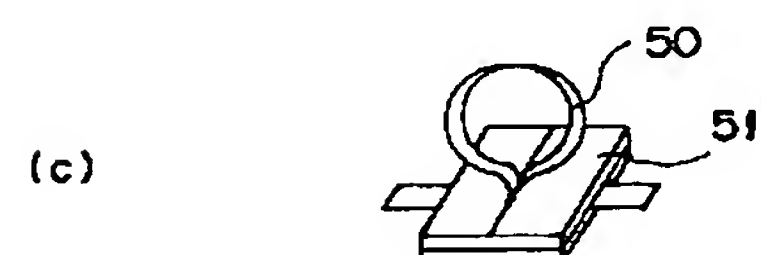
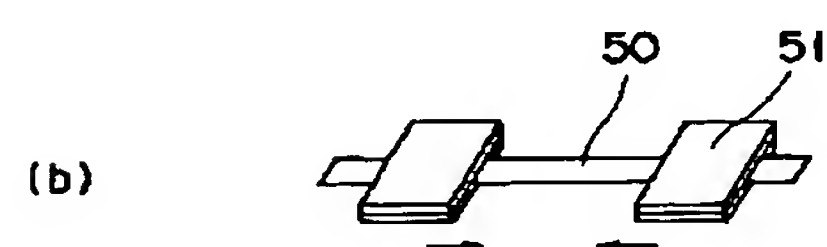
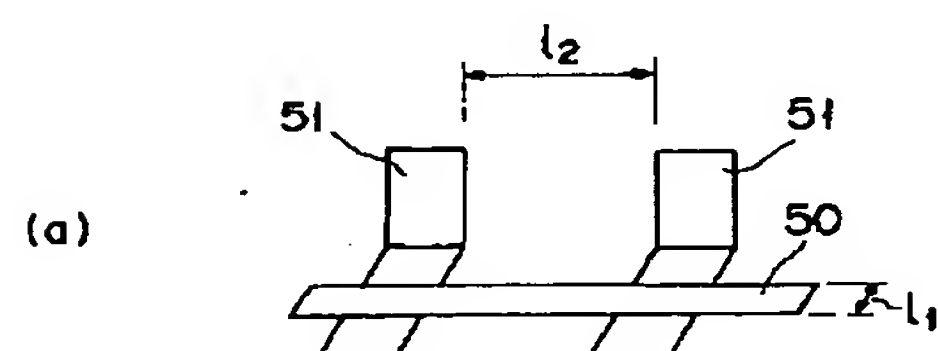
[Drawing 7]



[Drawing 6]



[Drawing 8]



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[Translation done.]